



# **PUBLIC HEALTH BULLETIN**

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## **Oral health among children in South Dakota**

*By Julie Ellingson, Oral Health Coordinator, Department of Health*

Tooth decay is an infectious disease affecting children and adults. Although tooth decay is largely preventable, it remains the most common chronic childhood disease, 5 times more common than asthma. This health problem begins early. National statistics show that 17 percent of children aged 2-4 years have already had decay. By the age of 8, approximately 52 percent of children have experienced decay, and by the age of 17, dental decay affects 78 percent of children. Once established, the disease requires treatment. A cavity only grows larger and more expensive to repair the longer it remains untreated.

Oral health and general health and well-being are inseparable and should not be considered separate entities. Research findings point to associations between oral health complications and heart and lung disorders, diabetes, stroke, low birth weight and premature births, tobacco, alcohol, and drug use, and dietary habits or nutritional disorders.

Dental disease is a serious public health issue that affects overall health and productivity and can have a profound effect on the quality of life. Those with complex health conditions are at greater risk of oral diseases that, in turn, further complicate overall health. Some general health diseases manifest in the mouth, and oral lesions may be the first signs of other life threatening diseases. Moreover, some common medications and therapies used to treat general health conditions can compromise the health of the mouth and oral functioning. Dental disease can lead to pain and disfigurement, low self-esteem, lost school or work days, nutritional problems and possible cardiac complications.

Many South Dakotans now enjoy markedly better oral health than their parents. However, certain segments of the population (e.g., those who are poor, who are members of racial or ethnic minority groups, or who are elderly) still have severe dental decay, much of which remains untreated. Healthy People 2010 seeks to eliminate these disparities so that all Americans receive the benefits of good oral health.

In 2002 the South Dakota Department of Health established an oral health program within the Office of Health Promotion. The purpose of the program is to improve the oral health of South Dakotans by addressing dental health needs such as access to care, workforce development and shortage needs, and education for consumers and professionals.

During the 2002-2003 school year, the South Dakota Department of Health conducted a statewide oral health survey of third grade children in public, private and Bureau of Indian Affairs (BIA) elementary schools. Surveillance of third graders is representative of the state of oral health among children and in line with the Healthy People 2010 Objectives.

### Healthy People 2010 Objectives

The National Oral Health Objectives for the Year 2010 (Healthy People 2010) outline several oral health status objectives for young children. For six- to eight-year-old children there are three primary oral health status objectives:

- To decrease the proportion of children who have experienced dental caries in permanent or primary teeth to 42 percent;
- To decrease the proportion of children with untreated dental caries in permanent or primary teeth to 21 percent;
- To increase the proportion of eight-year-olds receiving protective sealing of the occlusal surfaces of permanent molar teeth to 50 percent.

The state of South Dakota has exceeded the Healthy People 2010 objective for dental sealants. Unfortunately, significant progress must still be made in terms of caries history and untreated decay if South Dakota is to meet the other two objectives. About 67 percent of third grade children screened in South Dakota had experienced dental caries – much higher than the 2010 objective of 42 percent. About 30 percent of the South Dakota third grade children had untreated caries compared to the 2010 objective of 21 percent. Almost 53 percent of eight-year-old children screened had dental sealants compared to the 2010 objective of 50 percent.

### Oral Health of South Dakota's Third Grade Children Compared to Healthy People 2010 *Adjusted for Non-Response*

Variable	Percent of Children (95 Percent Confidence Interval)	
	South Dakota Third Grade Children	Healthy People 2010 Objective 6-8 year old children
Caries History	66.9 (60.8-73.0)	42
Untreated Decay	30.2 (22.8-37.5)	21
8 Year Olds Only		
Dental Sealants	52.7 (43.8-61.7)	50

Source: South Dakota Department of Health

### Key Findings of South Dakota Survey

- ✓ Dental decay is a significant public health problem in South Dakota.
  - 67 percent of the third graders have cavities and/or fillings (decay experience).
  - 30 percent of the third graders have untreated dental decay (cavities).
- ✓ While dental sealants are a proven method for preventing decay, many of South Dakota's third graders do not have access to this preventive service.
  - 53 percent of the third graders had dental sealants.

- ✓ A large proportion of South Dakota's third graders are in need of dental care.
  - 30 percent of the third graders were in need of dental care including almost 5 percent that needed urgent dental care because of pain or infection.
- ✓ Many of South Dakota's third graders have limited access to regular dental care.
  - 82 percent of the parents reported that their child had seen a dentist in the last 12 months, while 13 percent had not been in the last year and 5 percent had never been to a dentist.
  - Cost was the primary reason for not seeing a dentist in the last year.
- ✓ The majority of South Dakota's third graders have some type of coverage for dental care.
  - 76 percent of the parents reported that they have some type of dental insurance coverage for their child including private dental insurance, Medicaid and/or Indian Health Service.
- ✓ Third graders who have been to the dentist in the last year have better oral health than those who have not.
  - Third graders who have been to the dentist in the last year are less likely to have untreated decay and more likely to have dental sealants.
- ✓ Non-white third graders have poorer oral health.
  - Compared to white non-Hispanic third graders, a significantly higher proportion of American Indian third graders have decay experience (64 percent vs. 83 percent) and untreated decay (26 percent vs. 57 percent).
- ✓ The type of insurance coverage affects a child's oral health.
  - Compared to third graders with private dental insurance, a significantly higher proportion of third graders who pay for their dental care through government insurance or cash have untreated decay (19 percent vs. 45 percent and 35 percent).
  - Third graders in lower income schools tend to have poorer oral health. Fifty percent of third graders in lower income schools ( $\geq 50$  percent eligible for the free/reduced price meal program) had untreated decay compared to only 12 percent of third graders in higher income schools ( $\leq 20$  percent eligible for the free/reduced price meal program).

### Comparisons of the 2003 Data with the 1995-1997 Survey:

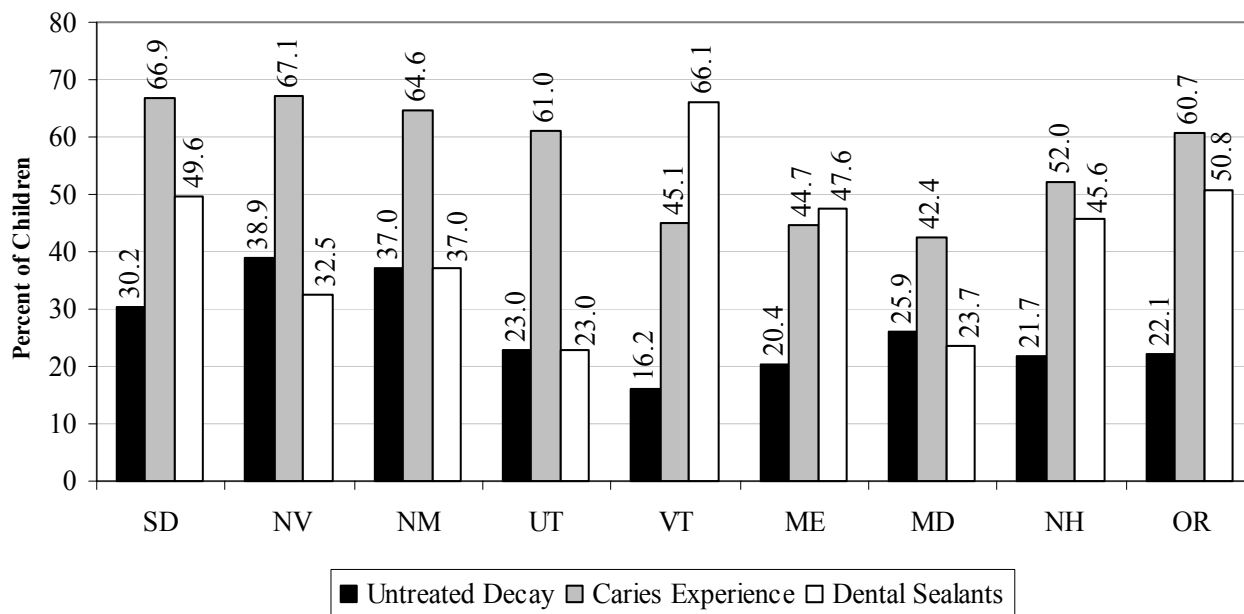
- ✓ **Decay experience:** 67 percent of the third graders surveyed had decay in the 2003 survey compared to 63 percent in 1995-1997.
- ✓ **Need for dental care:** 30 percent of the third graders in the 2003 survey were in need of dental care compared to 33 percent in 1995-1997.
- ✓ **Sealants:** 53 percent of third graders in the 2003 survey had dental sealants compared to 44 percent in 1995-1997.

These comparisons show that while there has been measurable improvement in the percentage of children having dental sealants and a small decrease in the percentage with cavities, the number of children with a history of dental caries has increased. This could indicate that even with sealants, there must be other preventive measures, such as dietary changes, regular brushing and flossing, and regular dental visits to reduce the burden of dental caries among children.

## Comparison to Other States

The following figure compares the oral health of South Dakota's third grade children with the oral health of third grade children from several other states. Each of the states on the graph collected data in a manner similar to South Dakota.

### Prevalence of Untreated Decay, Decay Experience, and Dental Sealants in South Dakota's Children Compared to Children from Other States – 3rd Grade Children Only



Source: South Dakota Department of Health  
National Oral Health Surveillance System ([www.cdc.gov/nohss](http://www.cdc.gov/nohss))

## Prevention

Health professionals can assist in promoting good oral health for children by:

- Performing oral health risk assessments
- Performing oral health screenings
- Providing parents/caregivers with anticipatory guidance
- Referring to a dental home
- Recognizing the following risk factors
  - Oral hygiene
  - Dietary habits and feeding practices
  - Oral health status of family
  - Access to regular dental care

These steps will contribute to the early diagnosis, prevention and treatment of oral disease and have a profound effect on general health and the quality of life.

*By Lon Kightlinger, MSPH, PhD, State Epidemiologist, Department of Health*

2003 was the fifth year of WNV transmission in North America and the second transmission season in South Dakota. The 2002 epidemic centered near the Mississippi and Ohio River valleys, whereas the 2003 epidemic was centered in Great Plains region. In 2003 North America experienced the largest ever recorded arboviral epidemic. South Dakota had the third most WNV cases and the highest incidence of neuroinvasive disease (NID) in the country.

Map of the United States showing the number of COVID-19 cases and deaths by state as of April 2020. The data is presented as a fraction (Cases/Deaths) for each state.

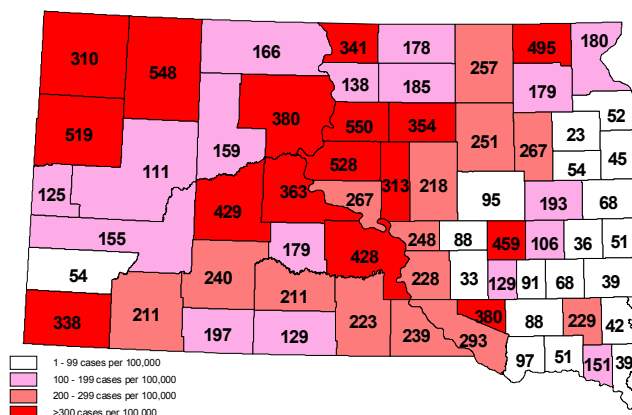
State	Cases/Deaths
AK	0/0
AL	3/37
AR	0/25
AS	0/0
AZ	1/13
CA	0/3
CO	61/2947
CT	0/17
DE	2/17
DC	0/3
MD	8/73
MA	1/17
NH	0/3
NJ	3/34
RI	1/7
VT	0/3
WA	0/1
WY	4/222
AK	5/617
MT	14/1039
ND	29/1942
SD	4/91
TX	37/717
UT	9/375
NM	4/209
OK	0/79
MO	8/64
IL	1/54
IN	4/47
MI	0/17
OH	2/19
PA	8/237
NY	11/71
MA	8/108
VT	1/14
RI	2/24
CT	0/6
DE	4/50
MD	1/87
VA	6/94
NC	8/123
SC	0/148
GA	4/148
FL	0/1

In South Dakota there were 1039 human cases of WNV disease and 2 cases of St Louis Encephalitis (SLE) reported in 2003 (Table 1). West Nile and SLE are both mosquito-borne flaviviruses that cause similar encephalitides. Of these cases 171 were diagnosed with neuro-invasive disease (NID 16%) and 870 had West Nile fever (84%), a milder form of the disease. There were 14 WNV-related deaths reported. In addition, 19 individuals also developed acute flaccid paralysis associated with WNV infection. There were 9 cases of pregnancy associated

with WNV infection reported and investigated. During the first year of transmission, 2002, there were 37 human WNV cases, including 14 cases of NID and 23 cases of WN Fever.

Human WNV disease was reported in every South Dakota county in 2003. Pennington County had the most cases, 139, and also had the most deaths, 4. The overall incidence of West Nile disease was 138 cases per 100,000 population. Figure 2 shows the incidence by county. Potter County had the highest incidence of WNV disease with 550 cases per 100,000 population; whereas, Codington County had the lowest incidence with 23 reported cases per 100,000. The high incidence counties were in the western and central part of the state. The overall statewide incidence of WNV NID was 23 cases per 100,000.

**Figure 2. Incidence of human West Nile disease (cases reported per 100,000 population), South Dakota 2003.**

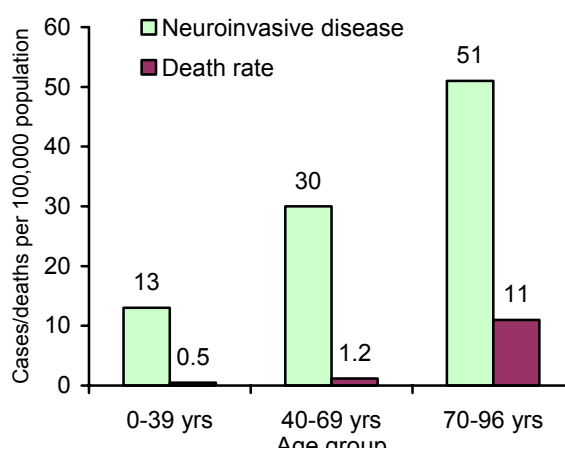


The screening of donated blood has enhanced the safety of the blood supply and prevented many cases of WNV disease. Nationally, at least 818 WNV viremic donations were detected and removed from the blood supply. In South Dakota 60 viremic blood donations were detected and removed from the blood supply. The South Dakota Department of Health also investigated 4 events of viremic blood transfusions or blood recipients becoming ill with WNV symptoms following transfusion.

Overall, 53% of the WNV cases were male (551) and 47% were female (490), Table 2. Males accounted for a disproportionate number of NID cases (62%) and deaths (71%).

The racial profile of South Dakota WNV cases shows 90% (932) white cases, 10% (107) Native American cases, and 0.2% (2) cases of other races, which reflects the race proportions of the state. Native Americans, however, had a disproportionate share severe morbidity and death with 18% of NID cases and 21% of deaths.

**Figure 3. West Nile neuroinvasive disease incidence and death rate by age, South Dakota, 2003.**



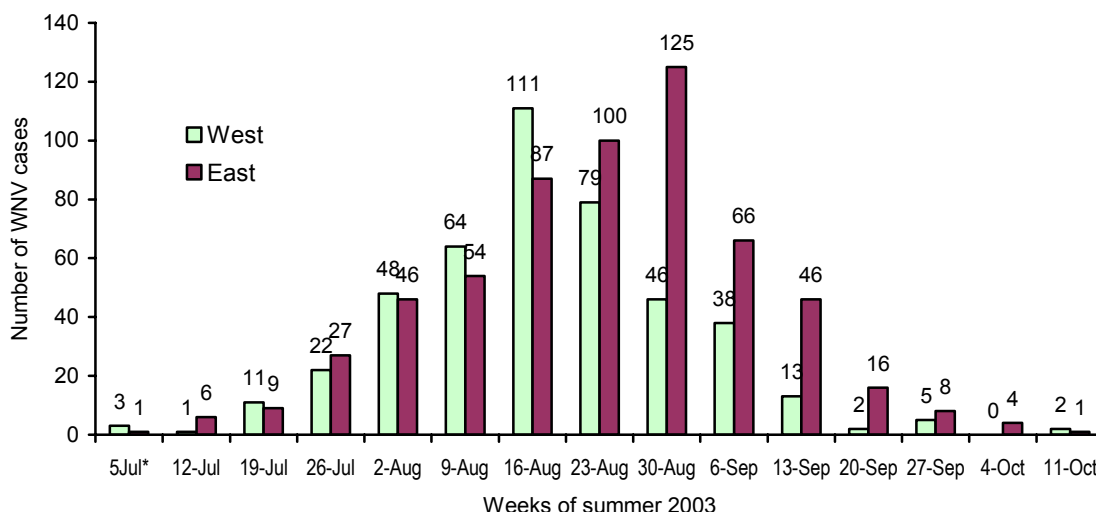
**Table 1. West Nile human and animal reports, South Dakota, 2003.**

County	Neuroinvasive disease	WN Fever	Total cases	Deaths	Blood donors	Birds	Horses	Other mammal
Aurora	0	1	1	0	0	1	0	0
Beadle	2	14	16	0	0	10	0	0
Bennett	2	5	7	1	0	2	1	0
Bon Homme	1	6	7	0	1	0	0	0
Brookings	4	15	19	0	0	10	2	0
Brown	6	84	90	1	8	4	3	0
Brule	2	10	12	0	0	0	1	0
Buffalo	2	3	5	0	0	0	0	0
Butte	7	40	47	0	4	2	4	0
Campbell	2	4	6	0	0	0	2	0
Charles Mix	2	25	27	0	1	0	0	0
Clark	2	9	11	0	1	0	1	dog
Clay	3	17	20	1	1	12	0	0
Codington	1	5	6	0	0	2	0	0
Corson	3	4	7	0	0	0	0	0
Custer	0	4	4	0	0	1	8	0
Davison	5	19	24	0	3	5	0	0
Day	1	10	11	0	0	4	0	0
Deuel	1	1	2	0	0	1	1	0
Dewey	5	18	23	0	0	0	0	0
Douglas	0	13	13	0	1	1	0	0
Edmunds	0	8	8	0	2	0	0	0
Fall River	7	18	25	1	0	1	10	0
Faulk	2	7	9	0	1	0	0	0
Grant	0	4	4	0	0	0	0	0
Gregory	0	11	11	0	0	0	1	0
Haakon	1	8	9	0	1	1	0	0
Hamlin	1	2	3	0	0	3	0	0
Hand	3	5	8	0	0	3	1	0
Hanson	1	2	3	0	0	0	1	0
Harding	3	1	4	0	0	0	0	0
Hughes*	3	41	44*	0	3	3	0	0
Hutchinson	2	5	7	1	4	1	0	0
Hyde	1	4	5	0	0	0	0	0
Jackson	0	6	6	0	0	0	7	0
Jerauld	2	0	2	0	2	1	0	0
Jones	0	2	2	0	0	0	1	0
Kingsbury	2	9	11	0	0	2	0	0
Lake	1	3	4	0	0	4	0	0
Lawrence	1	26	27	0	1	2	0	0
Lincoln	1	10	11	0	0	3	1	0
Lyman	2	15	17	0	0	1	1	0
Marshall	0	23	23	0	1	0	0	0
McCook	1	3	4	0	0	1	0	dog
McPherson	0	5	5	0	0	0	0	0
Meade	6	21	27	1	0	3	6	0
Mellette	2	3	5	0	0	0	0	0
Miner	0	3	3	0	0	4	0	0
Minnehaha	15	43	58	0	3	9	0	squirrel 2
Moody	0	1	1	0	0	3	0	0
Pennington	28	111	139	4	15	11	8	0
Perkins	1	17	18	0	0	0	1	0
Potter	3	11	14	0	1	0	0	0
Roberts	1	16	17	0	1	1	0	0
Sanborn	2	10	12	1	0	5	0	0
Shannon	11	16	27	2	0	0	1	0
Spink	4	14	18	0	0	0	0	0
Stanley*	0	10	10*	0	0	0	1	0
Sully	0	8	8	0	0	0	0	0
Todd	3	9	12	0	0	0	4	0
Tripp	3	11	14	0	0	0	1	0
Turner	2	18	20	0	1	8	0	0
Union	1	4	5	0	4	1	0	0
Walworth	2	6	8	0	0	0	0	0
Yankton	2	9	11	0	0	5	0	0
Ziebach	0	4	4	1	0	0	5	0
<b>TOTAL</b>	<b>171</b>	<b>870</b>	<b>1041</b>	<b>14</b>	<b>60</b>	<b>131</b>	<b>73</b>	<b>4</b>

\*Hughes and Stanley County each had 1 case of St. Louis Encephalitis

The median age of South Dakota cases was 44 years (range <1 month – 96 years). The median age increased with the NID case (50 years) and deaths (76 years). The risk of NID is highest in individuals over 50 years of age. The highest incidence of NID cases, 51 per 100,000, is among those 70 years and older (Figure 3). Of those cases over 70 years, 39% developed NID, whereas 14% of the younger cases developed NID (Table 2). The number and rate of WNV-associated death is also highest in those cases 70 years and older. Nine of the 14 WNV deaths (64%) occurred in this age group.

**Figure 4. Human WNV cases by week of illness onset, Eastern and Western\* South Dakota, 2003.**



\*Counties east or west of the Missouri River.

The first South Dakota WNV detection in 2003 was an antibody test on 8 May from a healthy, sentinel horse in Lincoln County. The initial bird detection of WNV was a crow from Hamlin County on 6 June, and the first mosquito detection was a pool of *Culiseta inornata* on 10 July from Hughes County. The first sick horse was diagnosed on 17 July in Jackson County.

The first South Dakotan to become ill was on 1 July, and the last person to become ill was on 10 October. This was a 101 day human WNV epidemic. The timeline graphic in Figure 4 shows the WNV human activity in eastern and western South Dakota in 2003. In the counties west of the Missouri River human WNV activity peaked during the week ending August 16th, while East River activity peaked 2 weeks later during the week ending August 30<sup>th</sup>.

Birds were collected and tested as leading surveillance indicators of WNV activity. A total of 346 birds were submitted in 2003, of which 131 tested WNV positive using PCR on brain tissue, 142 tested negative, and 85 were not tested due to decomposition or wrong species submission. The birds testing positive included 46 blue jays, 41 crows, 9 goshawks, 4 pelicans, 3 gyrfalcons, 3 prairie chickens, 3 red tail hawks, 3 sparrows, 2 mourning doves, 2 finches, 2 magpies, 2 owls, 1 cormorant, 1 crossbill, 1 duck, 1 goose, 1 robin, 1 woodpecker, and 5 birds of unknown species. Oral swab testing was run in parallel on crows and blue jays in 2003. West Nile positive birds were detected before human illness in 21 counties covering 62% of the state's population.



**Table 2. West Nile and SLE clinical syndromes by gender, race and age, South Dakota 2003**

	Neuroinvasive disease cases	Fever cases	Total cases	Deaths (%)
<b>Total cases (%)</b>	171 (16%)	870 (84%)	<b>1041</b>	14
<b>GENDER</b>				
Males (%)	107 (19%)	444 (81%)	<b>551</b>	10 (71%)
Females (%)	64 (13%)	426 (87%)	<b>490</b>	4 (29%)
<b>AGE</b>				
0 - 39 years (%)	55 (14%)	348 (86%)	<b>403</b>	2 (14%)
40 - 69 years (%)	75 (14%)	457 (86%)	<b>532</b>	3 (21%)
70 – 99 years (%)	41 (39%)	65 (61%)	<b>106</b>	9 (64%)
<b>RACE</b>				
White (%)	141 (15%)	791 (85%)	<b>932</b>	11 (79%)
Native American (%)	30 (28%)	77 (72%)	<b>107</b>	3 (21%)
Other (%)	0 (0%)	2 (100%)	<b>2</b>	0

In 2003 there were 73 horse WNV cases reported from 25 South Dakota counties. There were also 2 dogs and 2 WNV positive squirrels reported in 2003. During the previous year, 2002, there were 690 horses reported with WNV, with detections in all 66 counties. During the 2002 equine epizootic 34% of non-vaccinated horses with WNV illness died (A.R. Jones et al., Dept of Veterinary Science, SD State University).

The principle route of human WNV infection is the bite of an infected mosquito. In 2003, 31 pools of mosquitoes tested PCR positive for WNV from 4 South Dakota counties. The mosquitoes testing WNV positive included the following species (% of positives) *Culex tarsalis* (65%), *Aedes vexans* (10%), *Ochlerotatus dorsalis* (6%), *Ochlerotatus fitchii* (6%), *Aedes cinereus* (3%), *Culex pipiens* (3%), *Culiseta inornata* (3%) and *Culex salinarius* (3%). *Culex tarsalis* is thought to be the critical bridge vector between infected birds and humans.

As summer 2004 approaches we are preparing again for WNV transmission in South Dakota. Communities should improve their mosquito control programs, horses should be vaccinated, citizens should submit dead birds for testing and eliminate places where mosquitoes can grow, and everyone should use personal protective measures.

Although there are limitations to West Nile surveillance, we are provided with useful information on monitoring and managing the epidemic. In 2004 surveillance for West Nile includes tracking ill human, blood donor, equine, bird and mosquito detections, as well as pilot sentinel chicken flocks. It is not known if the human cases of WNV disease will increase or decrease in 2004. Health care providers must appreciate that serologic testing for WNV becomes more complicated after the WNV infection becomes regionally endemic due to residual anti-WNV IgM that may be still detectable from last summer's infections.

During WNV season individuals with severe or unusual headaches should seek medical care as soon as possible. Physicians are encouraged to have a high index of suspicion for WNV disease. Free WNV testing is available at the South Dakota Public Health Laboratory for ill suspects. We do not encourage testing mildly ill patients or individuals who wish to know if they have an antibody titer. Serum or CSF should be submitted to the Public Health Laboratory. If you have any questions call the laboratory at 1-800-592-1861.

**PHYSICIANS:** Human WNV testing is available at the South Dakota Public Health Laboratory (SDPHL) using IgM and IgG EIA method. These tests specify WNV, and also detect other arboviral antibodies. Human testing is **FREE** at SDPHL for patients with symptoms suggestive of WNV disease. Testing is supported by a CDC Epidemiology-Laboratory Capacity Grant.

**Pregnancy:** Symptomatic women should be tested. Screening asymptomatic pregnant women for WNV is not recommended. If a woman has WNV disease during pregnancy the fetus and newborn should be evaluated. (See MMWR 53: 154-157 for guidelines).

## **Submitting samples for WNV testing to the SDPHL**

**SERUM:** 2-3 ml of serum on cool packs collected **8 days after onset** of symptoms. Acute serum collected too early after onset may produce false negative IgM results.

**CEREBROSPINAL FLUID:** collected as soon as patient experiences neuro-symptoms. Send 2-3 ml of CSF on cool packs. Do not freeze.

- Shipping address: SDPHL, 615 East 4<sup>th</sup> Street, Pierre SD 57501
- Courier service: Call the lab at 1-800-592-1861
- Questions? Call the lab at 1-800-592-1861

## **West Nile Websites**

South Dakota West Nile website [www.state.sd.us/doh/WestNile](http://www.state.sd.us/doh/WestNile)

South Dakota Mosquitoes <http://biomicro.sdstate.edu/Hildrethm/mosquito/>

CDC West Nile website [www.cdc.gov/ncidod/dvbid/westnile/index.htm](http://www.cdc.gov/ncidod/dvbid/westnile/index.htm)

U.S. Department of Agriculture Animal and Plant Health Inspection Service  
[www.aphis.usda.gov/lpa/issues/wnv/wnv.html](http://www.aphis.usda.gov/lpa/issues/wnv/wnv.html)

U.S. Geological Survey [www.nwhc.usgs.gov/research/west\\_nile/west\\_nile.html](http://www.nwhc.usgs.gov/research/west_nile/west_nile.html)

National Institutes of Health [www.nih.gov/news/westnile.htm](http://www.nih.gov/news/westnile.htm)

Food and Drug Administration [www.fda.gov/oc/opacom/hottopics/westnile.html](http://www.fda.gov/oc/opacom/hottopics/westnile.html)

Cornell University WNV Section [www.cfe.cornell.edu/erap/wnv](http://www.cfe.cornell.edu/erap/wnv)

National Library of Medicine [www.nlm.nih.gov/medlineplus/westnilevirus.html](http://www.nlm.nih.gov/medlineplus/westnilevirus.html)

National Pesticide Information Center Web Site <http://npic.orst.edu/wnv>

American Mosquito Control Association [www.mosquito.org/](http://www.mosquito.org/)

West Nile News [www.westnilefever.com/](http://www.westnilefever.com/)

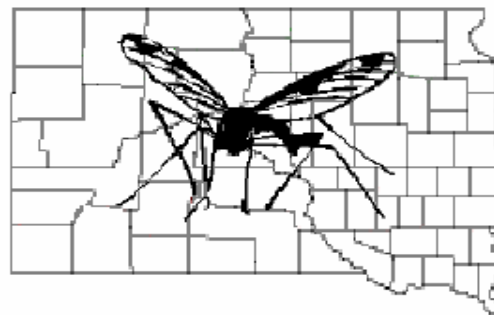
**South Dakota Department of Health 1-800-592-1861**

# Mosquitoes in South Dakota may be carrying the West Nile Virus (WNV) this summer.

Mosquitoes carry WNV from infected birds to humans and other animals.

## Protect yourself:

- \* Avoid being outdoors when mosquitoes are most active.
- \* Wear long sleeves and pants.
- \* Use mosquito repellent with DEET.
  - \* follow repellent label directions.
  - \* use up to 30% DEET for adults and children.
  - \* do not allow children to apply DEET, they need parent's help.
  - \* apply to exposed skin and clothing.
  - \* do not spray near face or inhale mist.
  - \* use no more DEET than necessary.
  - \* when children return indoors, wash exposed skin.
- \* Support your local community mosquito control efforts.



## West Nile Virus Symptoms

- |                 |                                |                        |
|-----------------|--------------------------------|------------------------|
| - Fever         | - Fatigue, weakness            | - Headache             |
| - Appetite loss | - Nausea or vomiting           | - Muscle aches         |
| - Rash          | - Eye pain                     | - Swollen lymph glands |
|                 | - Confusion, delirium or coma. |                        |
- Most people who become infected with WNV do not develop severe illness.
  - Illness usually develops 3 to 14 days after the bite of an infectious mosquito.
  - About 20% of people develop WNV fever.
  - Less than 1% of infected people develop a more severe neurological illness, encephalitis (inflammation of the brain).
  - Older people are more susceptible to severe WNV disease and should be especially careful to protect themselves.
  - ***If you have a severe or unusual headache, please seek medical attention.***

# West Nile Virus (WNV) Infection

## *Information for Clinicians*

Centers for Disease Control and Prevention and South Dakota Department of Health

### WNV Clinical Features

**Mild WNV Infection** Most WNV infections are mild and often clinically unapparent.

- Approximately 20% of those infected develop a mild illness (West Nile fever).
- The incubation period is thought to range from 3 to 14 days.
- Symptoms generally last 3 to 6 days.

The milder form of WNV infection is a febrile illness of sudden onset often accompanied by

- |            |            |                   |
|------------|------------|-------------------|
| ○ malaise  | ○ vomiting | ○ myalgia         |
| ○ anorexia | ○ eye pain | ○ rash            |
| ○ nausea   | ○ headache | ○ lymphadenopathy |

The full clinical spectrum of West Nile fever has not been determined in the United States.

**Severe WNV Infection** Approximately 1 in 150 infections results in severe neurological disease.

- The most significant risk factor for developing severe neurological disease is advanced age.
- Encephalitis is more commonly reported than meningitis.

Symptoms occurring among patients hospitalized with severe disease include:

- fever
- weakness
- A minority of patients with severe disease developed a maculopapular or morbilliform rash involving the neck, trunk, arms, or legs.
- Patients may experience severe muscle weakness and acute flaccid paralysis.
- Neurological presentations included:
 

○ ataxia and extrapyramidal signs	○ optic neuritis
○ cranial nerve abnormalities	○ polyradiculitis
○ myelitis	○ seizures

Although not observed in recent outbreaks, myocarditis, pancreatitis, and fulminant hepatitis have been described.

### Clinical Suspicion

Diagnosis of WNV infection is based on a high index of clinical suspicion and obtaining specific laboratory tests.

- WNV, or other arboviral diseases such as St. Louis encephalitis, should be strongly considered in adults  $\geq 50$  years who develop unexplained encephalitis or meningitis in summer or early fall.
- The local presence of WNV activity in birds and horses, or other human cases, should further raise suspicion.

Note: Severe neurological disease due to WNV infection has occurred in patients of all ages. Year-round transmission is possible in sub-tropical areas. Therefore, WNV should be considered in all persons with unexplained encephalitis and meningitis.

### Diagnosis and Reporting

**Diagnostic Testing** WNV testing for patients with West Nile disease symptoms can be obtained through the South Dakota Public Health Laboratory in Pierre (1-800-592-1861). Human testing is *FREE* at the Public Health Laboratory. The cost is supported by the CDC's Epidemiology-Laboratory Capacity Grant.

- The most efficient diagnostic method is detection of IgM antibody to WNV in serum (8-10 days after onset), or cerebral spinal fluid (CSF) collected within 8 days of illness onset using the IgM antibody capture enzyme-linked immunosorbent assay (MAC-ELISA).

- Since IgM antibody does not cross the blood-brain barrier, IgM antibody in CSF strongly suggests central nervous system infection.
- Patients who have been recently vaccinated against or recently infected with related flaviviruses (yellow fever, Japanese encephalitis, dengue) may have positive WNV MAC-ELISA results.

### **Reporting Suspected WNV Infection**

The timely identification of persons with acute WNV or other arboviral infection may have significant public health implications and will likely augment the public health response to reduce the risk of additional human infections.

- WNV encephalitis is on the list of designated nationally notifiable arboviral encephalitides, meningitis, fever and infection are legally reportable diseases in South Dakota (ARSD 44:20).  
To report call **1-800-592-1861**.

### **Laboratory Findings**

Among patients in recent outbreaks:

- Total leukocyte counts in peripheral blood were mostly normal or elevated, with lymphocytopenia and anemia also occurring.
- Hyponatremia was sometimes present, particularly among patients with encephalitis.
- Examination of the cerebrospinal fluid (CSF) showed pleocytosis, usually with a predominance of lymphocytes.
- Protein was universally elevated.
- Glucose was normal.
- Computed tomographic scans of the brain mostly did not show evidence of acute disease, but in about one-third of patients, magnetic resonance imaging showed enhancement of the leptomeninges, the periventricular areas, or both.

**Treatment** Treatment is supportive, often involving hospitalization, intravenous fluids, respiratory support, and prevention of secondary infections for patients with severe disease. Ribavirin, interferon  $\alpha$ 2b and anti-WNV immunoglobulin have been suggested to have some activity against WNV, but no controlled studies have been completed on the use of these or other medications.

For additional clinical information, please refer to Petersen LR and Marfin AA, "West Nile Virus: A Primer for the Clinician" *Annals of Internal Medicine* (August 6) 2002: 137:173-9.

For case definitions, see "Epidemic/Epizootic West Nile Virus in the United States: Revised Guidelines for Surveillance, Prevention, and Control, 2003," at <http://www.cdc.gov/ncidod/dvbid/westnile/resources/wnv-guidelines-apr-2001.pdf>

# West Nile Virus: phased response guidelines

Source: CDC Epidemic/Epizootic WNV in the United States: Guidelines for Surveillance, Prevention and Control, 3<sup>rd</sup> Revision, 2003.

Risk	Probability of human outbreak	Definition	Recommended response Local characteristics may alter the risk level at which specific actions are taken.
<b>0</b>	<b>None</b>	Off-season; adult mosquitoes inactive; climate unsuitable.	Develop WNV response plan. Secure surveillance and control resources necessary to enable emergency response. Initiate community outreach and public education programs. Conduct audience research to develop/ target education & community involvement. Contact community partners.
<b>1</b>	<b>Remote</b>	Spring, summer, or fall; Areas anticipating WNV activity based on previous WNV in the region; no current surveillance findings indicating WNV activity in the area.	<b>Response as in category 0</b> , plus: Conduct entomologic survey (inventory and map mosquito populations, monitor larval and adult mosquito density). Initiate source reduction. Use larvicides at specific sources identified by survey and targeted at likely amplifying and bridge mosquito species. Maintain avian mortality, mosquito and virus surveillance. Expand community outreach and public education programs focused on risk and personal protection, and emphasizing residential source reduction. Maintain surveillance (avian mortality, mosquito density /IR, human encephalitis/meningitis and horse illness).
<b>2</b>	<b>Low</b>	Summer, or fall; Areas with limited or sporadic WNV activity in birds and/or mosquitoes. No positives prior to August.	<b>Response as in category 1</b> , plus: Increase larval control, source reduction, and public education emphasizing personal protection measures, particularly among the elderly. Enhance human surveillance and activities to further quantify epizootic activity (e.g., mosquito trapping and testing). Implement adulticide applications if mosquito populations exceed locally established threshold levels, emphasizing areas where surveillance indicates potential for human risk to increase.
<b>3</b>	<b>Moderate</b>	Spring, summer, or fall; Areas with initial confirmation of epizootic WNV in birds before August; a horse and/or a human case, or sustained WNV activity in birds and/or mosquitoes.	<b>Response as in category 2</b> , plus: Intensify adult mosquito control in areas where surveillance indicates human risk. Initiate adult mosquito control if not already in progress. Initiate visible activities in community to increase attention to WNV transmission risk (speaker, social marketing efforts, community mobilization for source reduction, etc.). Work with collaborators to reduce risks to elderly (e.g., screen repair).
<b>4</b>	<b>High</b>	Spring, summer, or fall; WNV animal activity at a level suggesting high risk of human infection (high dead bird densities in early summer, sustained high mosquito infection rates, multiple positive mosquito species, horse or mammal cases indicating escalating animal transmission, or a human case). Areas with early season positive indicators where WN outbreak has occurred in past.	<b>Response as in category 3</b> , plus: Expand public information program to include TV, radio, and newspapers (use of repellents, personal protection, continued source reduction, risk communication about adult mosquito control), Increase visibility of public messages, engage key local partners (e.g., government officials, religious leaders) to speak about WNV. Intensify and expand active surveillance for human cases. Intensify adult mosquito control program, repeating applications in areas of high risk or human cases.
<b>5</b>	<b>Outbreak in Progress</b>	Multiple human cases; Conditions favoring continued transmission to humans (persistent high infection rate in mosquitoes, continued avian mortality due to WNV)	<b>Response as in category 4</b> , plus: Intensify emergency adult mosquito control program repeating applications as necessary to achieve adequate control. Enhance risk communication about adult mosquito control. Monitor efficacy of spraying on target mosquito populations. If outbreak is widespread and covers multiple jurisdictions, consider a coordinated widespread aerial adulticide application. Emphasize urgency of personal protection through community leaders and media, and emphasize use of repellent at visible public events.

South Dakota Department of Health - Infectious Disease Surveillance				
Selected Morbidity Report, 1 January – 30 May 2004 (provisional numbers)				
	Disease	2004 year-to-date	5-year median	Percent change
<b>Vaccine-Preventable Diseases</b>	Diphtheria	0	0	na
	Tetanus	0	0	na
	Pertussis	7	2	+250%
	Poliomyelitis	0	0	na
	Measles	0	0	na
	Mumps	0	0	na
	Rubella	0	0	na
	<i>Haemophilus influenza</i> type b	0	0	na
<b>Sexually Transmitted Infections and Blood-borne Diseases</b>	HIV infection	8	8	+0%
	Hepatitis B	0	0	na
	Chlamydia	748	607	+23%
	Gonorrhea	74	72	+3%
	Genital Herpes	118	107	+10%
	Syphilis, primary & secondary	0	0	na
<b>Tuberculosis</b>	Tuberculosis	3	8	-63%
<b>Invasive Bacterial Diseases</b>	<i>Neisseria meningitidis</i>	1	2	-50%
	Invasive Group A <i>Streptococcus</i>	8	6	+33%
<b>Enteric Diseases</b>	<i>E. coli</i> O157:H7	2	2	+0%
	Campylobacteriosis	31	28	+11%
	Salmonellosis	23	23	+0%
	Shigellosis	6	8	-25%
	Giardiasis	19	26	-27%
	Cryptosporidiosis	9	3	+200%
	Hepatitis A	2	1	+100%
<b>Vector-borne Diseases</b>	Animal Rabies	30	40	-25%
	Tularemia	0	0	na
	Rocky Mountain Spotted Fever	0	0	na
	Malaria	1	0	na
	Hantavirus Pulmonary Syndrome	1	0	na
	Lyme disease	0	0	na
	West Nile Virus disease	0	0	na
<b>Other Diseases</b>	<i>Streptococcus pneumoniae</i> , drug-resistant	1	1	+0%
	Legionellosis	1	1	+0%
	Additionally, the following diseases were reported: Bacterial Meningitis, non-meningococcal (9), Chicken pox (40), Invasive Group B <i>Streptococcus</i> (6), <i>Streptococcal</i> Toxic Shock Syndrome (1); MRSA, invasive (9); Viral encephalitis, herpes simplex virus (1)			

Communicable diseases are obligatorily reportable by physicians, hospitals, laboratories, and institutions.

The **Reportable Diseases List** is found at [www.state.sd.us/doh/Disease/report.htm](http://www.state.sd.us/doh/Disease/report.htm) or upon request.

Diseases are reportable by telephone, mail, fax, courier, or online.

**Telephones:** 24 hour answering device 1-800-592-1804; for a live person at any time call 1-800-592-1861; after hours emergency 605-280-4810.

**Fax** 605-773-5509.

**Mail** in a sealed envelope addressed to the DOH, Office of Disease Prevention, 615 E. 4th Street, Pierre, SD 57501, marked "Confidential Medical Report".

**Online:** Via secure website, [www.state.sd.us/doh/diseasereport](http://www.state.sd.us/doh/diseasereport)